

APPLICATION REVIEW

AND DETERMINATION OF INITIAL COMPLIANCE

FOR:

BARRICK GOLDSTRIKE MINES

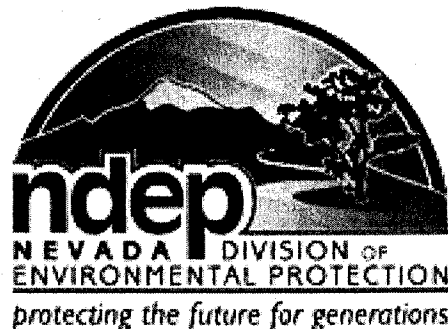
Eureka County, Nevada; HA – 61U

Class I Air Quality Operating Permit-to-Construct (OPTC)

AP1041-2805 (Revision)

FIN A0005, Resin-in-Leach (RIL) Project

Air Case #7349



BY

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR POLLUTION CONTROL

PAT MOHN, P.E.
STAFF ENGINEER III

JULY 2013



1.0 INTRODUCTION

On February 19, 2013, Barrick Goldstrike Mines, Inc. (BGM) submitted an application for revision of Class I Air Quality Operating Permit-to-Construct (OPTC) AP1041-2805. The draft permit covers modifications to BGM's proposed resin-in-leach (RIL) gold extraction facility. The current application was deemed administratively complete on March 28, 2013, which constitutes the Official Date of Submittal (ODS) of the application. The regulatory deadline for issuance/denial of the OPTC revision is September 24, 2013, 180 days after the ODS (NAC 445B.3364.10).

By June 3, 2013, the BAPC had completed the requisite air dispersion modeling, construction of a draft permit, and the technical review. However, on June 25, 2013, the BAPC received amendments to the original application from BGM. These amendments required that the BAPC reconstruct some permit conditions and re-model for all pollutants. At the very least, the BAPC is entitled to an extra 22 days to complete the technical review of the application. Therefore, the new deadline for issuance/denial of the OPTC revision will be no earlier than October 17, 2013.

The Standard Industrial Classification (SIC) code for this facility is 1041 (Gold Ore Processing). The BGM is a major stationary source, with emissions of one or more criteria pollutants greater than 250 tons per year. However, the proposed RIL project will not trigger PSD applicability thresholds for the BGM property as a whole, so PSD review is not required for this permit action.



2.0 DESCRIPTION OF PROCESS

2.1 OVERVIEW

BGM proposes the following changes to their Class I OPTC:

- Remove Systems 125A, 125B, 126A, and 126B from the permit.
- Revision to increase the hourly and annual SO₂ emission limits for System 67, Mercury Retorts 1-4. In addition, BGM amended the descriptive stack parameters for System 67, and added an SO₂ scrubber as one of the controls for System 67.
- Revision to decrease the hourly and annual SO₂ limits for System 68, Refinery Melting Furnaces & EW Cells.
- Add Systems 141A – TKI 12 MMBtu Boiler (Natural Gas) and 141B – TKI 12 MMBtu Boiler (Propane, Alt. Scenario).
- Add Systems 142A – TS Regen Heater (Natural Gas) and 142B – TS Regen Heater (Propane, Alt. Scenario).
- Add Systems 143A – Resin Regen Heater 1 (Natural Gas) and 143B – Resin Regen Heater 1 (Propane, Alt. Scenario).
- Add System 144 – RIL Emergency (Diesel) Generator (3,634 HP – 2,500 kW)
- Add IA1.001 and IA1.002 to the Insignificant Activity list. These were approved by the Director on October 26, 2011 (Air Case 12AP0159).
- Add Insignificant Activity, IA1.004 – Electrowinning Water Heater (2.5 MMBtu).

In addition to the revisions requested by BGM, the BAPC made the following corrections to the OPTC in general:

- Removal of the incorrect citation NAC 445B.346.2 from the various sections of the OPTC. The citation that was removed pertains to Class II Operating Permits only.
- Amend the NAC citations for reporting throughout the OPTC, so as to reference compliance with NAC 445B.001 – 445B.3689 (inclusive).
- Correct the emission limits for System 130 by combining the hourly and annual H₂S emissions for S2.336-S2.338 and for S2.339-S2.340. The total hourly and annual emission limits for the system as a whole are not changing.



3.0 APPLICABLE REGULATIONS

3.1 NEVADA REVISED STATUTES

The Nevada Revised Statutes (NRS) are the current codified laws of the State of Nevada. The NRS is the statutory authority for the adoption and implementation of administrative regulations. The statutes relating to the control of air pollution are contained in Title 40, Public Health and Safety, Chapter 445B, Air Pollution, NRS 445B.100 through NRS 445B.640. The NRS specifies that the State Environmental Commission is the governing body given the power to adopt administrative regulations. Because the NRS is the enabling statutory authority, very few specific requirements are contained in the statutes. Rather, the NRS provides, generally, broad authority for the adoption and implementation of air pollution control regulations. The BGM RIL facility will be subject to the NRS and will need to comply with all applicable regulations under the NRS. The NRS may be viewed at the following website:

<http://www.leg.state.nv.us/NRS/Index.cfm>

3.2 NEVADA ADMINISTRATIVE CODE

The Nevada Administrative Code (NAC) contains the regulations that have been adopted by the State Environmental Commission (SEC), pursuant to the authority granted by the Nevada Revised Statutes (NRS), relating to the control of air pollution. The NAC requires that, where State regulations are more stringent in comparison to Federal regulations, the State regulations are applicable. The NAC sets forth, by rule, maximum emission standards for visible emissions (opacity), PM₁₀ (particulate matter less than 10 microns in diameter) and sulfur emitting processes. Other requirements are established for incinerators, storage tanks, odors and maximum concentrations of criteria air pollutants in the ambient air. Other NAC regulations specify the requirements for applying for and method of processing applications for operating permits. All the equipment considered in this application must meet, at a minimum, the applicable standards and requirements set forth in the NAC, specifically, the emission standards contained in NAC 445B.22027 through 445B.22033 for particulate matter, 445B.2204 through 445B.22047 for sulfur emissions, 445B.22017 for opacity, and the Nevada Ambient Air Quality Standards as set forth in NAC 445B.310 through 445B.311. The NAC may be viewed at the following website:

<http://www.leg.state.nv.us/NAC/CHAPTERS.HTML>

3.3 NEVADA APPLICABLE STATE IMPLEMENTATION PLAN

The Applicable State Implementation Plan (ASIP) is a document that is prepared by a state or local air regulatory agency and required to be submitted to the U.S. EPA for approval. Title I of the Clean Air Act is the statutory authority for the U.S. EPA regulations that require a State to submit a ASIP. The contents of the ASIP are intended to show how a state, through the implementation and enforcement of the regulations contained in the ASIP, will either show how attainment of the national ambient air quality standards (NAAQS) will be achieved or how a state will continue to maintain compliance with the NAAQS.

3.4 CODE OF FEDERAL REGULATIONS

The Code of Federal Regulations (CFR) are regulations adopted by the U.S. EPA and published in the Federal Register pursuant to the authority granted by Congress in the Clean Air Act. The CFR addresses multiple aspects, including but not limited to, permitting requirements, performance standards, testing methods, and monitoring requirements. The CFRs may be viewed online at the following website: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=%2Findex.tpl>



3.0 APPLICABLE REGULATIONS (continued)

3.4.1 NEW SOURCE PERFORMANCE STANDARDS

Section 111 of the Clean Air Act, "Standards of Performance of New Stationary Sources," (NSPS) requires EPA to establish federal emission standards for source categories which cause or contribute significantly to air pollution. Each NSPS defines the facilities subject to these requirements and prescribes emission limits for specified pollutants, compliance requirements, monitoring requirements, and test methods and procedures. These standards are intended to promote use of the best air pollution control technologies, taking into account the cost of such technology and any other non-air quality, health, and environmental impact and energy requirements. These standards apply to sources which have been constructed or modified since the proposal of the standard. Since December 23, 1971, the Administrator has promulgated 88 such standards and associated test methods. These standards can be found in the CFR at Title 40 (Protection of Environment), Part 60 (Standards of Performance for New Stationary Sources).

Generally, state and local air pollution control agencies are responsible for implementation, compliance assistance, and enforcement of the NSPS. EPA retains concurrent enforcement authority and is also available to provide technical assistance when a state or local agency seeks help. EPA also retains a few of the NSPS responsibilities such as the ability to approve alternative monitoring methods to maintain a minimum level of national consistency.

This section outlines the NSPS applicability for the new permitted emission units.

- System 141A/B: 12 MMBtu TKI Boiler: This equipment is subject to 40 CFR Part 60, Subpart Dc – *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units*. Because System 141 combusts only gaseous fuels (i.e. natural gas or propane), there are no periodic testing requirements or emission limits. Only notification and monitoring apply, as set forth in the draft revised OPTC.
- The new process heaters of Systems 142 and 143 are exempt from 40 CFR Part 60, Subpart Dc, because they are not steam generating units.
- System 144: RIL Emergency Generator (3,634 HP – 2,500 kW): The new RIL Emergency Generator (diesel-fired) is subject to 40 CFR Part 60, Subpart IIII – *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (ICE)*. BGM requested 100 hours per year of operation for non-emergency use, which qualifies the unit as an emergency generator, as set forth in the NSPS standard. The CAT 3516C (2,500 kW) engine is certified to the Tier 2 standards, and only the Tier 2 standards apply to this size engine under Subpart IIII.



3.0 APPLICABLE REGULATIONS (continued)

3.4.2 FEDERAL NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

NESHAP for hazardous air pollutants (HAPs) are established in the CFR pursuant to Section 112 of the Clean Air Act Amendments of 1990. These standards regulate air pollutants that are believed to be detrimental to human health. The NESHAP program applies to all sources, both existing and new. These standards are codified in Title 40 CFR Parts 61 and 63.

Part 61, which predates the Clean Air Act Amendments of 1990, includes specific standards, reporting and recordkeeping requirements, and test methods for the initial eight hazardous air pollutants: asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. The regulations covering these eight hazardous air pollutants focused on health-based considerations. NESHAPs were established for certain operations that commonly emit the eight hazardous air pollutants.

Other substances were included for consideration due to the serious health effects, including cancer, which may occur from ambient air exposure to those substances. However, no specific restrictions were placed on facilities that used or released these compounds.

Under the Clean Air Act Amendments of 1990, Congress greatly expanded the Air Toxics program, creating a list of 189 substances to be regulated as hazardous air pollutants. Rather than regulating individual pollutants by establishing health-based standards, the new Air Toxics program granted EPA the authority to regulate specific industrial major source categories with NESHAPs based on maximum achievable control technology (MACT) for each source category. Thus, a number of NESHAPs have been established to regulate specific categories of stationary sources that emit (or have the potential to emit) one or more hazardous air pollutants.

The standards in 40 CFR Part 63 are independent of the NESHAPs contained in 40 CFR Part 61 which remain in effect until they are amended, if appropriate, and added to this part. More information on NESHAPs can be found at the EPA Unified Air Toxics Website (<http://www.epa.gov/ttn/atw/>).

NESHAPs may cover both major sources and area sources in a given source category. Major sources are defined as those facilities emitting, or having the potential to emit, 10 tons per year or more of one Hazardous Air Pollutant (HAP) or 25 tons per year or more of multiple HAPs. Major sources are required to comply with MACT standards. Area Sources are defined as those facilities that are not major sources.

The following outlines the NESHAP applicability for the current permit action:

- System 141 (12 MMBtu TKI Boiler) is exempt from the new NESHAP for *Boilers* (i.e. Boiler MACT), 40 CFR Part 63, Subpart JJJJJ, because this emission unit is located at an *Area Source* (of HAPs) and combusts only gaseous fuels. As such, this unit is considered a "gas-fired boiler", because it combusts natural gas and propane, thus qualifying System 141 for the exemption under the provisions of Subpart JJJJJ, as set forth in 40 CFR 63.11195(e).
- The process heaters of new Systems 142 and 143 are not subject to 40 CFR Part 63, Subpart JJJJJ because they are not boilers. Process heaters are covered only under the *major source* boiler MACT (40 CFR Part 63, Subpart DDDDD), but BGM is not considered a major source of HAPs.



3.0 APPLICABLE REGULATIONS (continued)

3.4.2 FEDERAL NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (CONTINUED)

- System 144: RIL Emergency Generator: This equipment is subject to 40 CFR Part 63, Subpart ZZZZ – NESHAP for *Stationary Reciprocating Internal Combustion Engines*. However, if the requirements are met for NSPS Subpart IIII, then there are no further applicable requirements under Subpart ZZZZ.

3.4.3 PREVENTION OF SIGNIFICANT DETERIORATION DETERMINATION

The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act permitting program for new and modified major stationary sources of air pollution. Implementation of the federal PSD regulations is delegated to the State of Nevada by U.S. EPA and these regulations are contained at 40 CFR Part 52.21. Therefore, BAPC implements the federal PSD regulations directly. These regulations specify federally required permitting procedures for each "major stationary source".

"Major" is defined as the potential to emit of a stationary source, which equals or exceeds a specified threshold (in tons per year) of any air pollutant regulated under the Clean Air Act (40 CFR 52.21(b)(1)). The first threshold is for a stationary source that emits or has the potential to emit 100 tons per year or more of any regulated NSR pollutant and is defined as one of 28 specific categories of sources (see 40 CFR 52.21(b)(1)(i)(a)). The other applicability threshold is for any other stationary source that emits or has the potential to emit 250 tons per year of any regulated NSR pollutant (see 40 CFR 52.21(b)(1)(i)(b)).

BGM is a major PSD stationary source for several pollutants (see Section 4). BGM's Title V renewal permit was issued in January 2008. Since then, various applications for revision of BGM's Title V permit have been processed. No application for revision since the 2008 renewal has triggered PSD permitting requirements, nor has there been a determination that any of those projects required aggregation. The increase in emissions from the proposed revisions to the OPTC do not exceed PSD significant emissions levels for any PSD pollutant for which the BGM property is already a major stationary source. As such, a PSD applicability determination for the current permit action is not required. Moreover, project aggregation is not required, because the proposed revisions included in the OPTC are not related to any past projects in BGM's current Title V permit.



3.0 APPLICABLE REGULATIONS (continued)

3.4.4 COMPLIANCE ASSURANCE MONITORING (CAM) – 40 CFR Part 64

Compliance Assurance Monitoring (CAM) plans are required for major sources required to obtain Title V (Part 70 or 71) permits. The CAM rule was signed on October 3, 1997 and came into effect on November 21, 1997. The U.S. EPA developed the CAM rule to focus on monitoring of certain operating parameters to ensure compliance with emission limitations in-between scheduled source tests. CAM requirements apply to stationary sources that: (1) are equipped with post-process pollutant control devices; (2) have pre-control device emissions equal to or greater than 100% of the major source threshold for a pollutant; and (3) are subject to the Title V permit program.

It must be noted that, because the current permit action involves a state-only OPTC, CAM requirements do not apply in this case.



4.0 EMISSIONS INVENTORY

4.1 PROPOSED EMISSIONS

The facility-wide emissions inventory summary for the current OPTC is presented in Table 4.1. The facility is a major stationary source for PM, PM₁₀, SO₂, NO_x, and CO. However, for brevity, the table below only shows the net change in emissions for the current permit action involving the OPTC.

With respect to PSD applicability for the proposed Class I OPTC revision, the net changes do not trigger PSD applicability, because they do not exceed the PSD SEL thresholds listed below. It must be noted that most emissions *decrease* as a result of the proposed revisions to the Class I OPTC. The net SO₂ PTE increases by only 1.03 tons per year.

The RIL project adds less than 1 tpy total HAPs, mainly from fuel combustion, and secondarily from gold refining operations (Hg). The BAPC has verified in previous permit actions that the BGM facility as a whole will remain an area source of HAPs, with the emissions of any single HAP < 10 tpy, or the emissions of any combination of HAPs < 25 tpy. As part of processing their Title V renewal application, BGM will be required to provide an updated HAP inventory.

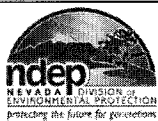
Based on the foregoing, the proposed revisions to the Class I OPTC will not trigger any PSD permitting requirements for NSR pollutants or GHG's.

Table 4.1
Barrick Goldstrike - RIL Circuit OPTC Revision

Potential-to-Emit (July 2013)

System	OPTC Annual Emissions (tons/yr)								
	PM	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO	VOC	H ₂ S	CO _{2e}
Totals for June 2011 New Class I OPTC	7.40	7.32	7.32	9.93	32.19	58.43	9.22	0.81	52,263
Totals for July 2013 Revised Class I OPTC	4.62	4.54	4.54	10.96	16.13	16.67	2.83	0.81	14,291
Net Change in PTE for July 2013 OPTC Revision	-2.78	-2.78	-2.79	1.03	-16.06	-41.76	-6.39	0.00	-37,972
PSD Significant Emissions Levels (SELs)	25	15	10	40	40	100	Barrick not major for these pollutants		75,000

Note: Barrick Goldstrike is a major stationary source for PM, PM₁₀, SO₂, NO_x, and CO (PTE > 250 tpy for each of these pollutants). However, only the emissions inventory for the changes associated with modification of the Class I OPTC are summarized and compared to the PSD SELs. The large decrease in CO_{2e} is largely the result of Barrick's removal of a large (81 MMBtu) boiler from the permit. However, several smaller combustion units were added for the July 2013 permit revision. PSD review is not required for this permit action.



5.0 AMBIENT AIR IMPACT ANALYSIS

5.1 INTRODUCTION/ PURPOSE

The purpose of this analysis is to determine the likely air quality impacts resulting from operation of the BGM property after the proposed revisions are made.

5.2 CLASSIFICATION OF AIR BASIN

The BGM property is located in Air Quality Hydrographic Basin (HA) 61U, the Boulder Flat Area (Upper) of the Humboldt River Basin. HA 61U is currently unclassified for all criteria pollutants. The unclassifiable designation has been developed due to lack of available monitoring data to properly classify the air basin. HA 61U is not triggered for PSD.

5.3 AIR QUALITY MODELING ANALYSIS

5.3.1 AIR DISPERSION MODEL

The BAPC performed the requisite air dispersion modeling analysis and environmental evaluation for the current permit action using the currently approved/preferred U.S. EPA model AERMOD. The BAPC performed check runs to assess the sensitivity of the model to minor changes in source input parameters. The BAPC used Lakes Environmental's *AERMOD-View* graphical-user interface to input source information, generate receptors, and to actually run AERMOD (v. 12345).

5.3.2 AVERAGING PERIODS

The BAPC performed check model runs for all criteria pollutants for which there is an air quality standard and a PTE. These included PM₁₀ (24-hour, Annual), SO₂ (3-hour, 24-hour, Annual), NO_x (Annual), CO (1-hour and 8-hour), and H₂S (1-hour). Ozone impacts were determined using Scheffe screening tables (see below). The Nevada Ambient Air Quality Standards (AAQS) are listed in Table 5.4-1. Demonstration of compliance with the Nevada AAQS is done by modeling the highest-first-high (H1H) concentration for each pollutant for short-term averaging periods. Because the current permit action did not trigger PSD permitting, modeling for the 1-hour SO₂, 1-hour NO_x, and PM_{2.5} was not performed.

5.3.3 SOURCE PARAMETERS

Source input parameters were provided by BGM. No hour-of-day scalars (HROFDY) were used in the modeling. All emission sources were modeled at their maximum (or higher) hourly emission rates. All emission sources were referenced to the UTM NAD 83 project datum, as were buildings, fenceline corners, and receptors. There are 118 point and 143 volume sources in the model, with fewer point sources in the model for the gaseous pollutants. Some process equipment with multiple release points were modeled as a single point source.

5.3.4 RECEPTORS

The BAPC placed plant boundary receptors at 25 meter intervals, with a proximal receptor array spaced at 50 meter intervals out to a distance of 300 meters from the fenceline. Distal receptors extend 1,500 m from the fenceline and are spaced in a rectilinear 50x100 meter grid. A total of 14,160 receptors were included in the model.



5.0 AMBIENT AIR IMPACT ANALYSIS (CONTINUED)

5.3.5 METEOROLOGICAL DATA

One-year of on-site meteorological data was used for modeling. BGM processed on-site meteorological data for the year 2007 using the AERMOD meteorological pre-processor AERMET.

However, the newest version of AERMOD will not run with .SFC and .PFL files prepared using older versions of AERMET. Therefore, BGM's AERMET run-stream files and raw meteorological data were re-processed by the BAQP, using a more recent, compatible version of AERMET (v. 12345).

Informational messages in the AERMOD output file indicated greater than 50% missing data in the meteorological file, presumably due to missing "cloud cover" descriptors in the original meteorological file. However, the BAQP verified that BGM's original 2007 raw meteorological data was at least 90% complete. The BAQP also explained that AERMET does not require cloud cover data, but instead uses measured solar radiation. It must be noted that the AERMOD runs using .SFC and .PFL files created in AERMET version 06341 did not generate the "missing cloud cover" informational message in the final AERMOD output, despite the fact that the same raw meteorological data was used.

A review of the most recent description of how the AERMOD model was formulated (EPA-454/R-03-004, 2004) corroborates the BAQP's determination regarding cloud cover data. The EPA document clearly stated that missing cloud cover data is substituted by on-site solar radiation measurements and the 2m and 10m temperature gradient. Therefore, it is highly unlikely that the missing cloud cover data would have any impact on the final model results.

5.3.6 BUILDING DOWNWASH

In accordance with current U.S. EPA and BAPC guidelines, building downwash was considered for all model runs. Building downwash effects were evaluated using the BPIP-PRIME algorithm to calculate projected building heights and widths for each point source in the model. This information is used by AERMOD to determine whether plume dispersion from a particular point source will be influenced by building downwash. In general, building downwash will cause the model to generate higher pollutant concentrations at the closest point of public access. The results indicated that building downwash effects are pronounced for most of the point sources in the model.

5.3.7 TERRAIN

AERMOD requires that elevated terrain be considered in air dispersion modeling analyses. Therefore, elevations were processed in AERMAP (v. 11103) using the National Elevation Dataset (NED, 30 m), processed in NAD 83 coordinates.

5.3.8 BACKGROUND CONCENTRATIONS

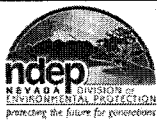
The BAPC has not operated any ambient monitoring sites in the vicinity of the BGM property. Therefore, PM₁₀ backgrounds of 10.2 µg/m³ and 9 µg/m³ (pristine, rural areas) were used for the 24-hour and annual averaging periods, respectively. Background concentrations for the gaseous pollutants are assumed to be zero.

5.0 AMBIENT AIR IMPACT ANALYSIS (CONTINUED)

5.4 AIR QUALITY IMPACT ASSESSMENT

Results of air dispersion modeling are presented in Table 5.4-1. As can be seen, operation of the BGM property with the proposed revisions to the OPTC will not result in violations of the Nevada AAQS, because the total impacts (plus background) are less than the applicable AAQS values. Modeling by the BAPC confirmed that the highest impacts were at the fenceline.

Table 5.4-1							
Barrick Goldstrike - RIL Circuit July 2013 Revision							
BAPC Air Dispersion Model - July 2013							
Pollutant	AAQS Averaging Period	BAPC Model Met Year	BAPC 2013 Model	Backgr. Conc.	BAPC Total Impact	AAQS	BAPC Percent of Standard
			µg/m3	µg/m3	µg/m3	µg/m3	%
PM ₁₀	24-hr	2007	51.8	10.2	62.0	150	41
	Annual	2007	10.2	9	19.2	50	38
SO ₂	3-hr	2007	63.4	0	63.4	1,300	5
	24-hr	2007	10.9	0	10.9	365	3
	Annual	2007	2.3	0	2.3	80	3
NOX	Annual	2007	6.7	0	6.7	100	7
CO	1-hr	2007	1,368	0	1,368	40,500	3
	8-hr	2007	269	0	269	7,000	4
H ₂ S	1-hr	2007	104.6	0	104.6	112	94
O ₃	1-hr	N/A	32	0	32	235	14
Note: One year on on-site meteorology was used for modeling. PM10 background values are from monitoring performed at Lehman Caves, Great Basin NP. Ozone increment based on Scheffe screening tool. The 1-hour SO ₂ , 1-hour NOX, and PM _{2.5} standards were not modeled, because the current permit action is not a PSD action, and because these standards have not yet been adopted as Nevada standards.							

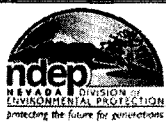


5.0 AMBIENT AIR IMPACT ANALYSIS (CONTINUED)

5.5 OZONE SCREENING

BGM performed an assessment of worst-case, potential ozone impacts from operation of the BGM property. Ozone screening was performed using reference tables in the U.S. EPA document entitled, *VOC/NO_x Point Source Screening Tables*, by Richard Scheffe (1988), based upon the annual PTE for NO_x and VOCs. The Scheffe method gives a good indication of the maximum ozone impacts for the 1-hour averaging period, taking into consideration a common array of photochemical mechanisms for formation of ozone in both rural and urban settings.

Using the Scheffe method, the BAPC determined that the maximum ozone increment will be 32 µg/m³, with the 1-hour ozone standard of 235 µg/m³. Therefore, ozone screening using the Scheffe method demonstrates compliance with the Nevada AAQS. As such, a more refined modeling analysis for ozone is not warranted for this permit action.



6.0 CONCLUSIONS / RECOMMENDATIONS

Based on the above review and supporting data and analyses, operation of the BGM property under the new conditions of the draft revised Class I OPTC, will not result in violations of any applicable ambient air quality standards.

Appendix 1 – Barrick RIL Process Flow Diagram

Appendix 2 – Emissions Inventory Spreadsheets for revised and new systems

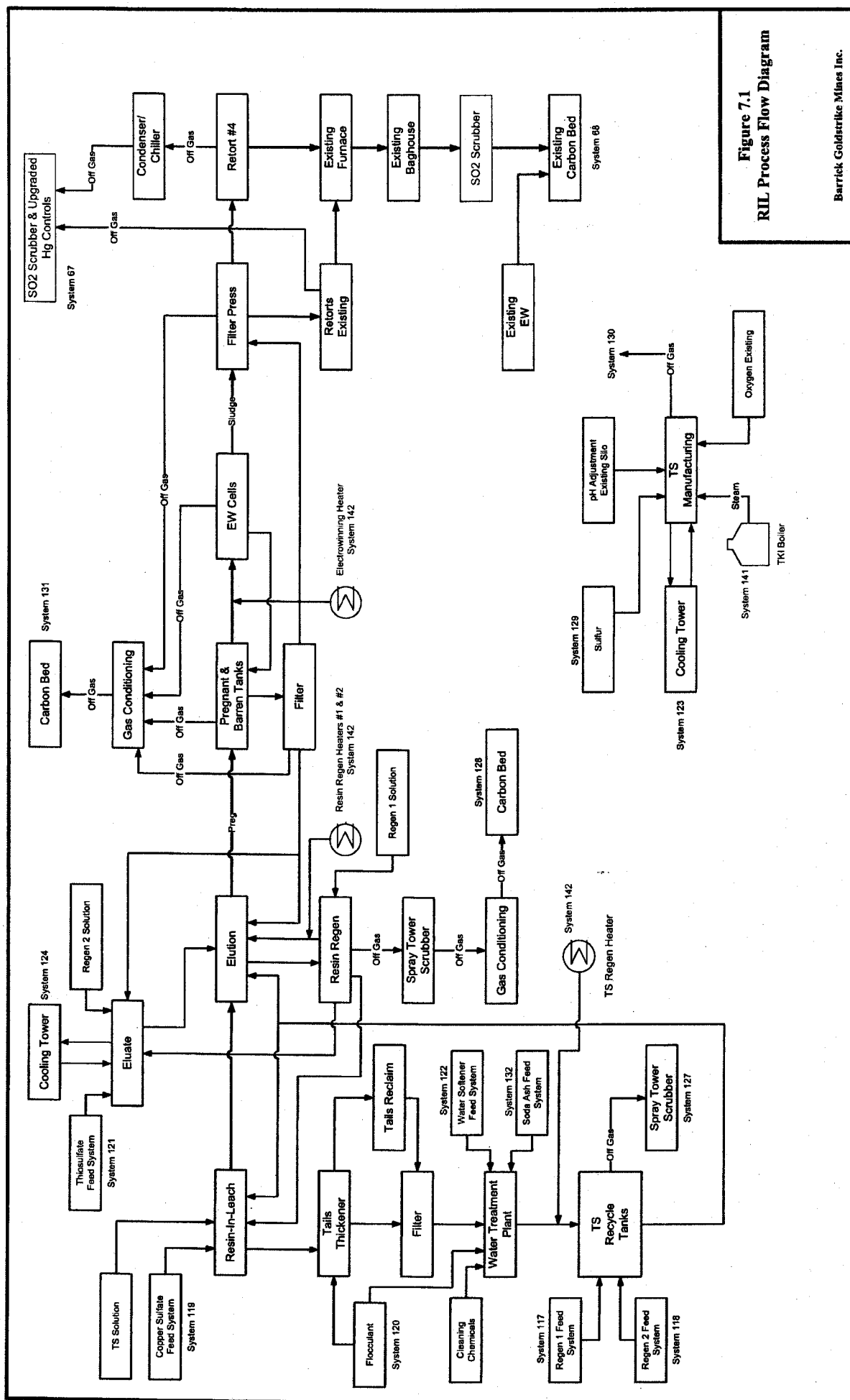
Appendix 3 – BAPC Draft Revised Class I OPTC AP1041-2805

Pat Mohn, Staff Engineer III

Date

Jeffrey Kinder, P.E.
Supervisor, Permitting Branch

Date



Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN:

A0005

Permit Number:

AP1041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

MERCURY RETORTS 1 - 4, S2.009 - S2.011, S2.341

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349
XXXX
XXXX

REVISION
TYPE OF AP
TYPE OF AP

Alt Operating Scenario?

YES/NO

NO

Revision?

YES

Increasing hourly and annual SO2 emission limits.

Approved:

Date:

7/26/2013

I. EMISSION UNIT(S):

System	S2.XXX/ PF1.XXX	Description	Location UTM NAD 83 (m)		Manufacturer	Model #	Serial #	SCC #	Year
			North	East					Manufactured
67	SYS67	MERCURY RETORTS 1 - 4	4,536,176	554,526	ENVIROCARE			3-03-024-05	1998

II. CONTROL DEVICE(S):

Stack Parameters	Pollutant	Control(s)			Notes
		Type	Control (%)	Manufacturer's Guarantee	
				Factor	
Height (ft): 85	PM				
Diameter (ft): 1.0	PM10				
Temp (°F): 190	PM2.5				
Exit Vel (fps): 15.75	SO2	SO2 Scrubber	98.6%		Manu. Guarantee
Vol (ACFM): 742	NOX				
Vol (DSCFM): 400	CO				
	VOC				
	Pb				
	Hg				
	H2S				
	HAPS				

III. Operating Parameters:

Operating Hours		Throughput/Fuel Usage			Heat Input (MMBtu)		Power Output		Heat Content
hr/day	hr/yr	Hourly	Annual	Unit	Fuel Type	Hourly	Annual	Hourly	
24	8,760	2.4	21,024.0	ton					

Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.

	Coal (BTU/lb)	Diesel (BTU/gal)	Gasoline (BTU/gal)	Natural Gas (BTU/scf)	Propane (BTU/gallon)
Default	13,000	138,000	114,000	1,020	91,500

If used a formula to calculate: TYPE FORMULA

IV. Emission Limit Calculations:

Pollutant	Other Emission Factor		Actual Emission Factor		Emission Limit		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr		
SO2			57.7381	lb/ton	138.57	606.94		Applicant-requested limits

Formula for Uncontrolled Limit (lb/hr):

Pollutant	Controlled Factor		Controlled Factor (%Control)		Emission Limit		Emission Limit (%Control)		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr		
SO2			0.8083334	lb/ton			1.94	8.50		Applicant-requested limits

Formula for Controlled Limit(lb/hr):

State Requirements: Maximum Allowables (Formulas subject to change with Heat Input Rate)

Federally Enforceable SIPS	Formula(s)	Where X=	Where Y=	Y	Unit	Where P=	Where E=	E	Units
NAC 445B.2203		NA	NA	NA					
NAC 445B.22047		NA	NA	NA					
NAC 445B.22033						2.400		4.10 * [2.4] ^ 0.67	7.37 lbs/hr
NAC 445B.22017									

Permitted Emission Limits

Pollutant	Emission Factor	Unit	lb/hr	ton/yr	Reference	Notes	Factor	Compare to Source Testing	Unit	lb/hr	ton/yr
SO2	0.8083334	lb/ton	1.94	8.50	0	Applicant-requested limits					

VI. Hazardous Air Pollutants:

HAP Pollutant	Uncontrolled Factor	Uncontrolled Unit	Controlled Factor	Controlled Unit	Hazardous Air Pollutants		Controlled		Removal Factor	Calculation Reference
					Emission (lb/hr)	Emission (ton/yr)	Emission (lb/hr)	Emission (ton/yr)		
TOTALS:					0.00034296	0.001502165	0.00034296	0.001502165		Ph2 MOPTC
Hg	1.43E-04	lb/ton	1.43E-04	lb/ton	3.43E-04	1.50E-03	3.43E-04	1.50E-03		Ph2 MOPTC

Nevada Division of Environmental Protection Bureau of Air Pollution Control				Facility Name: BARRICK GOLDSTRIKE				By: PAT MOHN		Date: 5/21/2013							
POLLUTANTS EMISSIONS CALCULATIONS				Project Name: RIL CIRCUIT OPTC				Air Case: 7349 XXXX XXXX		REVISION TYPE OF AP TYPE OF AP							
FIN: A0005		Permit Number: AP1041-2805		System: E/W Melting Furnaces + EW Cells, S2.013, S2.014, and S2.344													
Alt Operating Scenario?		YES/NO		Notes						Approved:		Date: 7/24/2013					
Revision?		YES		Decrease hourly and annual SO2 limits.													
I. EMISSION UNIT(S):																	
System		S2.XXX/ PF1.XXX		Description		Location UTM NAD 83 (m)		Manufacturer		Model #		Serial #		SCC #		Year Manufactured	
68		SYS68		E/W MELTING FURNACES + EW CELLS		North 4,536,191 East 554,549		POWERTRAK				E915016524611 W877773024611		3-03-024-05			
II. CONTROL DEVICE(S):																	
Stack Parameters				Pollutant		Type		Control (%)		Control(s) Manufacturer's Guarantee		Factor		Unit		Notes	
Height (ft): 88				PM		BH+SO2 Scrubber										Current Permit Limits	
Diameter (ft): 1.67				PM10		BH+SO2 Scrubber										Current Permit Limits	
Temp (°F): 117.5				PM2.5		BH+SO2 Scrubber										Current Permit Limits	
Exit Vel (fps): 82				SO2		SO2 Scrubber		98.6%								Manu. Guarantee	
Vol (ACFM): 10,818				NOX													
Vol (DSCFM): 9,100				CO													
				VOC													
				Pb													
				Hg		Carbon Filter										Phase 2 NMCP	
				H2S													
				HAPS													
III. Operating Parameters:																	
Operating Hours		Throughput/Fuel Usage		Heat Input (MMBtu)		Power Output		Heat Content									
hr/day 24		hr/yr 8,760		Hourly 1.2 Annual 10,512.0 Unit ton		Fuel Type Hourly Annual		Hourly Unit		Hourly Unit		Heat Content					
Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.																	
Default		Coal (BTU/lb) 13,000		Diesel (BTU/gal) 140,000		Gasoline (BTU/gal) 114,000		Natural Gas (BTU/scf) 1,020		Propane (BTU/gallon) 90,500		If used a formula to calculate: TYPE FORMULA					
IV. Emission Limit Calculations:																	
Pollutant		Other Emission Factor Factor Unit		Uncontrolled Actual Emission Factor Factor Unit		Emission Limit lb/hr ton/yr		Reference		Notes							
PM				2.333 lb/ton		2.80 3.06		Current Permit Limits.									
PM10				2.333 lb/ton		2.80 3.06		Current Permit Limits.									
PM2.5				2.333 lb/ton		2.80 3.06		Current Permit Limits.									
SO2				10.11907 lb/ton		12.14 53.19		Apply 98.6% control.									
Formula for Uncontrolled Limit (lb/hr):																	
Pollutant		Controlled Factor Factor Unit		Controlled Factor (%Control) Factor Unit		Emission Limit lb/hr ton/yr		Emission Limit (%Control) lb/hr ton/yr		Reference Notes							
PM				2.333 lb/ton				2.80 3.06		Current Permit Limits.							
PM10				2.333 lb/ton				2.80 3.06		Current Permit Limits.							
PM2.5				2.333 lb/ton				2.80 3.06		Current Permit Limits.							
SO2				0.1417 lb/ton				0.17 0.74		Apply 98.6% control.							
Formula for Controlled Limit(lb/hr):																	
Permitted Emission Limits																	
Pollutant		Emission Factor Factor Unit		lb/hr ton/yr		Reference Notes		Factor		Compare to Source Testing Unit lb/hr ton/yr							
PM		2.333 lb/ton		2.80 3.06		Current Permit Limits.											
PM10		2.333 lb/ton		2.80 3.06		Current Permit Limits.											
PM2.5		2.333 lb/ton		2.80 3.06		Current Permit Limits.											
SO2		0.1417 lb/ton		0.17 0.74		Apply 98.6% control.											
VI. Hazardous Air Pollutants:																	
Hazardous Air Pollutants																	
HAP Pollutant		Uncontrolled Factor Unit		Controlled Factor Unit		Uncontrolled Emission (lb/hr) Emission (ton/yr)		Controlled Emission (lb/hr) Emission (ton/yr)		Removal Factor Calculation Reference							
TOTALS:						0.39 1.7082		0.39 1.71E+00		NMCP Phase 2 NMCP Phase 2							
Hg		3.25E-01 lb/ton		3.25E-01 lb/ton		3.90E-01 1.71E+00		3.90E-01 1.71E+00									

Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN:

A0005

Permit Number:

AP1041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

12 MMBTU, TKI BOILER (NATURAL GAS)

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349
XXXX
XXXX

REVISION
TYPE OF AP
TYPE OF AP

Alt Operating Scenario?

YES/NO

Notes

Revision?

NO

Add new 12 MMBtu TKI Boiler

YES

Approved:

Date:

7/26/2013

I. EMISSION UNIT(S):

System	S2 XXX/ PF1 XXX	Description	Location UTM NAD 83 (m)		Manufacturer	Model #	Serial #	SCC #	Year Manufactured
			North	East					
141A	S2.361NG	TKI BOILER 12 MMBTU	4,536,106	554,928				1-01-006-02	

II. CONTROL DEVICE(S):

Stack Parameters	Pollutant	Control(s)		Notes
		Type	Control (%)	
Height (ft):	PM			
Diameter (ft):	PM10			
Temp (°F):	PM2.5			
Exit Vel (fps):	SO2			
Vol (ACFM):	NOX			
Vol (DSCFM):	CO			
	VOC			
	Pb			
	Hg			
	H2S			
	HAPS			

III. Operating Parameters:

Operating Hours		Throughput/Fuel Usage		Heat Input (MMBtu)		Power Output		Heat Content (BTU/scf)
hr/day	hr/yr	Hourly	Annual	Fuel Type	Hourly	Annual	Hourly	
24	8,760	11,760	103,017,600	Natural Gas	12.00	105,077.95		1,020
Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.								
Default		Coal (BTU/lb) 13,000	Gasoline (BTU/gal) 140,000	Natural Gas (BTU/scf) 1,020	Propane (BTU/gallon) 90,500			If used a formula to calculate: TYPE FORMULA

IV. Emission Limit Calculations:

Pollutant	Other Emission Factor		Actual Emission Factor		Emission Limit		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr		
PM			0.011	lb/MMBtu	0.13	0.58	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
PM10			0.011	lb/MMBtu	0.13	0.58	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
PM2.5			0.011	lb/MMBtu	0.13	0.58	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
SO2			0.017	lb/MMBtu	0.20	0.89	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
NOX			0.090	lb/MMBtu	1.08	4.73	Applicant-requested limits.	Manu. Data
CO			0.164	lb/MMBtu	1.97	8.62	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
VOC			0.026	lb/MMBtu	0.31	1.37	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.

Formula for Uncontrolled Limit (lb/hr):

Pollutant	Controlled Factor		Controlled Factor (%Control)		Emission Limit		Emission Limit (%Control)		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr		
PM			0.011	lb/MMBtu			0.13	0.58	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
PM10			0.011	lb/MMBtu			0.13	0.58	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
PM2.5			0.011	lb/MMBtu			0.13	0.58	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
SO2			0.017	lb/MMBtu			0.20	0.89	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
NOX			0.090	lb/MMBtu			1.08	4.73	Applicant-requested limits.	Manu. Data
CO			0.164	lb/MMBtu			1.97	8.62	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.
VOC			0.026	lb/MMBtu			0.31	1.37	Applicant-requested limits.	AP-42 Sec. 1.4 w/ safety factor.

Formula for Controlled Limit(lb/hr):

V. Green House Gases

Factor	Unit	lb/hr	ton/yr	GWP Multiplier	GWP lb/hr	GWP ton/yr	Reference	Using Source Testing	
								GWP lb/hr	GWP ton/yr
CO2	117.00	lb/MMBtu	1,404.0	6,147.1	1	1,404.0	6,147.1		
CH4	0.0022	lb/MMBtu	0.0	0.1	21	0.6	2.4		
N2O	0.0006	lb/MMBtu	0.0	0.0	310	2.2	9.8		
TOTAL CO2e:						1,407	6,159	0	

VI. Hazardous Air Pollutants:

HAP Pollutant	Uncontrolled		Controlled		Hazardous Air Pollutants		Controlled		Removal Factor	Calculation Reference
	Factor	Unit	Factor	Unit	Emission (lb/hr)	Emission (ton/yr)	Emission (lb/hr)	Emission (ton/yr)		
TOTALS:					0.000999146	0.004	0.000999146	0.004		AP42 Table 1.4-3
2-Methylnaphthalene	2.35E-08	lb/MMBtu	2.35E-08	lb/MMBtu	2.82E-07	1.24E-06	2.82E-07	1.24E-06		AP42 Table 1.4-3
3-Methylchloranthrene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
7,12-Dimethylbenz(a)anthracene	1.57E-08	lb/MMBtu	1.57E-08	lb/MMBtu	1.88E-07	8.24E-07	1.88E-07	8.24E-07		AP42 Table 1.4-3
Acenaphthene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Acenaphthylene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Anthracene	2.35E-09	lb/MMBtu	2.35E-09	lb/MMBtu	2.82E-08	1.24E-07	2.82E-08	1.24E-07		AP42 Table 1.4-3
Benz(a)anthracene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Benzene	2.06E-06	lb/MMBtu	2.06E-06	lb/MMBtu	2.47E-05	1.08E-04	2.47E-05	1.08E-04		AP42 Table 1.4-3
Benzo(a)pyrene	1.18E-09	lb/MMBtu	1.18E-09	lb/MMBtu	1.41E-08	6.18E-08	1.41E-08	6.18E-08		AP42 Table 1.4-3
Benzo(b)fluoranthene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Benzo(g,h,i)perylene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Benzo(k)fluoranthene	2.06E-06	lb/MMBtu	2.06E-06	lb/MMBtu	2.47E-05	1.08E-04	2.47E-05	1.08E-04		AP42 Table 1.4-3
Chrysene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Dibenzo(a,h)anthracene	1.18E-09	lb/MMBtu	1.18E-09	lb/MMBtu	1.41E-08	6.18E-08	1.41E-08	6.18E-08		AP42 Table 1.4-3
Dichlorobenzene	1.18E-06	lb/MMBtu	1.18E-06	lb/MMBtu	1.41E-05	6.18E-05	1.41E-05	6.18E-05		AP42 Table 1.4-3
Fluoranthene	2.94E-09	lb/MMBtu	2.94E-09	lb/MMBtu	3.53E-08	1.55E-07	3.53E-08	1.55E-07		AP42 Table 1.4-3
Fluorene	2.75E-09	lb/MMBtu	2.75E-09	lb/MMBtu	3.29E-08	1.44E-07	3.29E-08	1.44E-07		AP42 Table 1.4-3
Formaldehyde	7.35E-05	lb/MMBtu	7.35E-05	lb/MMBtu	8.82E-04	3.86E-03	8.82E-04	3.86E-03		AP42 Table 1.4-3
Hexane	4.22E-07	lb/MMBtu	4.22E-07	lb/MMBtu	5.06E-06	2.22E-05	5.06E-06	2.22E-05		PERF 1997, AP42 poor factor rating
Indeno(1,2,3-cd)pyrene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	2.12E-08	9.27E-08	2.12E-08	9.27E-08		AP42 Table 1.4-3
Naphthalene	5.98E-07	lb/MMBtu	5.98E-07	lb/MMBtu	7.18E-06	3.14E-05	7.18E-06	3.14E-05		AP42 Table 1.4-3
Phenanthrene	1.67E-08	lb/MMBtu	1.67E-08	lb/MMBtu	2.00E-07	8.76E-07	2.00E-07	8.76E-07		AP42 Table 1.4-3
Pyrene	4.90E-09	lb/MMBtu	4.90E-09	lb/MMBtu	5.88E-08	2.58E-07	5.88E-08	2.58E-07		AP42 Table 1.4-3
Toluene	3.33E-06	lb/MMBtu	3.33E-06	lb/MMBtu	4.00E-05	1.75E-04	4.00E-05	1.75E-04		AP42 Table 1.4-3

Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN: A0005

Permit Number: AP1041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

12 MMBTU TKI BOILER (PROPANE)

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349
XXXX
XXXX

REVISION
TYPE OF AP
TYPE OF AP

Alt Operating Scenario?

Revision?

YES/NO

YES

YES

Notes

Alternative fuel is propane

Add 12 MMBtu TKI Boiler w/ability to combust propane. Some permit limits slightly different because of rounding errors by the applicant.

Approved:

Date:

7/26/2013

I. EMISSION UNIT(S):

System	S2.XXX/ PF1.XXX	Description	Location UTM NAD 83 (m)		Manufacturer	Model #	Serial #	SCC #	Year Manufactured
			North	East					
141B	S2.361P	TKI BOILER 12 MMBTU (PROPANE)	4,536,106	554,928				1-02-010-02	

II. CONTROL DEVICE(S):

Stack Parameters	Pollutant	Control(s)		Manufacturer's Guarantee		Notes
		Type	Control (%)	Factor	Unit	
Height (ft): 25	PM					
Diameter (ft): 1.67	PM10					
Temp (°F): 400	PM2.5					
Exit Vel (fps): 61.1	SO2					
Vol (ACFM): 8,000	NOX					
Vol (DSCFM): 2,900	CO					
	VOC					
	Pb					
	Hg					
	H2S					
	HAPS					

III. Operating Parameters:

Operating Hours		Throughput/Fuel Usage		Heat Input (MMBtu)		Power Output		Heat Content (BTU/gallon)
hr/day	hr/yr	Hourly	Annual	Fuel Type	Hourly	Annual	Hourly	
24	8,760	131.0	1,147,560	Propane	12.0	105,002		91,500
Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.								
		Coal (BTU/lb)	Diesel (BTU/gal)	Gasoline (BTU/gal)	Natural Gas (BTU/scf)	Propane (BTU/gallon)		
Default		13,000	140,000	114,000	1,020	91,500		
If used a formula to calculate: TYPE FORMULA								

IV. Emission Limit Calculations:

Pollutant	Other Emission Factor		Actual Emission Factor		Uncontrolled		Emission Limit		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr		
PM			1.010	lb/1000 gallon	0.13	0.58			AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	s.f. = safety factor
PM10			1.010	lb/1000 gallon	0.13	0.58			AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
PM2.5			1.010	lb/1000 gallon	0.13	0.58			AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
SO2			1.550	lb/1000 gallon	0.20	0.89			AP-42, Sec. 1.5, SO2 = 0.10*S	S = 15.5 gr/100 cu.ft. gas (185 ppmw)
NOX			8.240	lb/1000 gallon	1.08	4.73			Manu. Data	
CO			15.010	lb/1000 gallon	1.97	8.61			AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
VOC			2.396	lb/1000 gallon	0.31	1.37			AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
Formula for Uncontrolled Limit (lb/hr):										

Pollutant	Controlled Factor		Controlled Factor (%Control)		Controlled		Emission Limit		Emission Limit (%Control)		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
PM			1.01	lb/1000 gallon					0.13	0.58	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	s.f. = safety factor
PM10			1.01	lb/1000 gallon					0.13	0.58	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
PM2.5			1.01	lb/1000 gallon					0.13	0.58	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
SO2			1.55	lb/1000 gallon					0.20	0.89	AP-42, Sec. 1.5, SO2 = 0.10*S	S = 15.5 gr/100 cu.ft. gas (185 ppmw)
NOX			8.24	lb/1000 gallon					1.08	4.73	Manu. Data	
CO			15.010	lb/1000 gallon					1.97	8.61	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
VOC			2.396	lb/1000 gallon					0.31	1.37	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
Formula for Controlled Limit(lb/hr):												

Pollutant	Emission Factor				Reference		Notes	Factor	Unit	Compare to Source Testing	
	Factor	Unit	lb/hr	ton/yr	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	ton/yr					
PM	1.010	lb/1000 gallon	0.13	0.58	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)		s.f. = safety factor				
PM10	1.010	lb/1000 gallon	0.13	0.58	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)						
PM2.5	1.010	lb/1000 gallon	0.13	0.58	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)						
SO2	1.550	lb/1000 gallon	0.20	0.89	AP-42, Sec. 1.5, SO2 = 0.10*S		S = 15.5 gr/100 cu.ft. gas (185 ppmw)				
NOX	8.240	lb/1000 gallon	1.08	4.73	Manu. Data						
CO	15.010	lb/1000 gallon	1.97	8.62	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)		Permitted annual limit higher than calc'd due to rounding error.				
VOC	2.396	lb/1000 gallon	0.31	1.37	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)						

V. Green House Gases

Factor	Unit	lb/hr	ton/yr	GWP Multiplier	GWP lb/hr	GWP ton/yr	Reference	GWP lb/hr	Using Source Testing	GWP ton/yr
CO2	139.00	lb/MMBtu	1,666.1	7,297.6	1	1,666.1	7,297.6			
CH4	0.0070	lb/MMBtu	0.1	0.4	21	1.8	7.7			
N2O	0.0019	lb/MMBtu	0.0	0.1	310	4.8	21.2			
TOTAL CO2e:					1,673	7,326	0			

VI. Hazardous Air Pollutants:

Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN:

A0005

Permit Number:

API041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

TS REGEN HEATER (NATURAL GAS)

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349
XXXX
XXXX

REVISION
TYPE OF AP
TYPE OF AP

Alt Operating Scenario?

YES/NO

Notes

Revision?

NO

Add new TS Regen Heater to permit - primary scenario natural gas combustion

YES

Approved:

Date:

5/21/2013

I. EMISSION UNIT(S):

System	S2 XXX/ PF1.XXX	Description	Location UTM NAD 83 (m)		Manufacturer	Model #	Serial #	SCC #	Year Manufactured
			North	East					
142A	S2 362NG	TS REGEN HEATER	4,536,401	554,477				1-01-006-02	

II. CONTROL DEVICE(S):

Stack Parameters	Pollutant	Control(s)		Notes
		Type	Control (%)	
Height (ft):	PM			
Diameter (ft):	PM10			
Temp (°F):	PM2.5			
Exit Vel (fps):	SO2			
Vol (ACFM):	NOX			
Vol (DSCFM):	CO			
	VOC			
	Pb			
	Hg			
	H2S			
	HAPS			

III. Operating Parameters:

Operating Hours		Throughput/Fuel Usage		Heat Input (MMBtu)		Power Output		Heat Content (BTU/scf)
hr/day	hr/yr	Hourly	Annual	Fuel Type	Hourly	Annual	Unit	
24	4,380	6,863.0	30,059,940.0	Natural Gas	7.00	30,661.14		1,020
Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.								
		Coal (BTU/lb)	Diesel (BTU/gal)	Gasoline (BTU/gal)	Natural Gas (BTU/scf)	Propane (BTU/gallon)		
Default		13,000	140,000	114,000	1,020	90,500		
If used a formula to calculate: TYPE FORMULA								

IV. Emission Limit Calculations:

Pollutant	Other Emission Factor		Actual Emission Factor		Emission Limit		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr		
PM			0.011	lb/MMBtu	0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
PM10			0.011	lb/MMBtu	0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
PM2.5			0.011	lb/MMBtu	0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
SO2			0.017	lb/MMBtu	0.12	0.26	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
NOX			0.213	lb/MMBtu	1.49	3.27	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
CO			0.164	lb/MMBtu	1.15	2.51	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
VOC			0.026	lb/MMBtu	0.18	0.40	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor

Formula for Uncontrolled Limit (lb/hr):

Pollutant	Controlled Factor		Controlled Factor (%Control)		Emission Limit		Emission Limit (%Control)		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr		
PM			0.011	lb/MMBtu			0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
PM10			0.011	lb/MMBtu			0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
PM2.5			0.011	lb/MMBtu			0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
SO2			0.01714	lb/MMBtu			0.12	0.26	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
NOX			0.213	lb/MMBtu			1.49	3.27	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
CO			0.164	lb/MMBtu			1.15	2.51	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor
VOC			0.026	lb/MMBtu			0.18	0.40	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor

Formula for Controlled Limit(lb/hr):

Pollutant	Emission Factor		lb/hr	ton/yr	Reference	Notes	Compare to Source Testing		lb/hr	ton/yr
	Factor	Unit					Factor	Unit		
PM	0.011	lb/MMBtu	0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				
PM10	0.011	lb/MMBtu	0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				
PM2.5	0.011	lb/MMBtu	0.08	0.17	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				
SO2	0.017	lb/MMBtu	0.12	0.26	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				
NOX	0.213	lb/MMBtu	1.49	3.27	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				
CO	0.164	lb/MMBtu	1.15	2.51	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				
VOC	0.026	lb/MMBtu	0.18	0.40	AP-42, Sec. 1.4 w/ s.f. (applicant-requested)	s.f. = safety factor				

V. Green House Gases

	Factor	Unit	lb/hr	ton/yr	GWP Multiplier	GWP lb/hr	GWP ton/yr	Reference	Using Source Testing GWP lb/hr	GWP ton/yr
CO2	117.00	lb/MMBtu	819.0	1,793.7	1	819.0	1,793.7			
CH4	0.0022	lb/MMBtu	0.0	0.0	21	0.3	0.7			
N2O	0.0006	lb/MMBtu	0.0	0.0	310	1.3	2.9			
TOTAL CO2e:						821	1,797	0		

VI. Hazardous Air Pollutants:

HAP Pollutant	Uncontrolled		Controlled		Uncontrolled		Controlled		Removal Factor	Calculation Reference
	Factor	Unit	Factor	Unit	Emission (lb/hr)	Emission (ton/yr)	Emission (lb/hr)	Emission (ton/yr)		
TOTALS:					0.001	0.001	0.001	0.001		AP42 Table 1.4-3
2-Methylnaphthalene	2.35E-08	lb/MMBtu	2.35E-08	lb/MMBtu	1.65E-07	3.61E-07	1.65E-07	3.61E-07		AP42 Table 1.4-3
3-Methylchloranthrene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
7,12-Dimethylbenz(a)anthracene	1.57E-08	lb/MMBtu	1.57E-08	lb/MMBtu	1.10E-07	2.40E-07	1.10E-07	2.40E-07		AP42 Table 1.4-3
Acenaphthene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Acenaphthylene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Anthracene	2.35E-09	lb/MMBtu	2.35E-09	lb/MMBtu	1.65E-08	3.61E-08	1.65E-08	3.61E-08		AP42 Table 1.4-3
Benz(a)anthracene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Benzene	2.06E-06	lb/MMBtu	2.06E-06	lb/MMBtu	1.44E-05	3.16E-05	1.44E-05	3.16E-05		AP42 Table 1.4-3
Benzo(a)pyrene	1.18E-09	lb/MMBtu	1.18E-09	lb/MMBtu	8.24E-09	1.80E-08	8.24E-09	1.80E-08		AP42 Table 1.4-3
Benzo(b)fluoranthene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Benzo(g,h,i)perylene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Benzo(k)fluoranthene	2.06E-06	lb/MMBtu	2.06E-06	lb/MMBtu	1.44E-05	3.16E-05	1.44E-05	3.16E-05		AP42 Table 1.4-3
Chrysene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Dibenzo(a,h)anthracene	1.18E-09	lb/MMBtu	1.18E-09	lb/MMBtu	8.24E-09	1.80E-08	8.24E-09	1.80E-08		AP42 Table 1.4-3
Dichlorobenzene	1.18E-06	lb/MMBtu	1.18E-06	lb/MMBtu	8.24E-06	1.80E-05	8.24E-06	1.80E-05		AP42 Table 1.4-3
Fluoranthene	2.94E-09	lb/MMBtu	2.94E-09	lb/MMBtu	2.06E-08	4.51E-08	2.06E-08	4.51E-08		AP42 Table 1.4-3
Fluorene	2.75E-09	lb/MMBtu	2.75E-09	lb/MMBtu	1.92E-08	4.21E-08	1.92E-08	4.21E-08		AP42 Table 1.4-3
Formaldehyde	7.35E-05	lb/MMBtu	7.35E-05	lb/MMBtu	5.15E-04	1.13E-03	5.15E-04	1.13E-03		AP42 Table 1.4-3
Hexane	4.22E-07	lb/MMBtu	4.22E-07	lb/MMBtu	2.95E-06	6.47E-06	2.95E-06	6.47E-06		PERF 1997, AP42 poor factor rating
Indeno(1,2,3-cd)pyrene	1.76E-09	lb/MMBtu	1.76E-09	lb/MMBtu	1.24E-08	2.71E-08	1.24E-08	2.71E-08		AP42 Table 1.4-3
Naphthalene	5.98E-07	lb/MMBtu	5.98E-07	lb/MMBtu	4.19E-06	9.17E-06	4.19E-06	9.17E-06		AP42 Table 1.4-3
Phenanthrene	1.67E-08	lb/MMBtu	1.67E-08	lb/MMBtu	1.17E-07	2.56E-07	1.17E-07	2.56E-07		AP42 Table 1.4-3
Pyrene	4.90E-09	lb/MMBtu	4.90E-09	lb/MMBtu	3.43E-08	7.51E-08	3.43E-08	7.51E-08		AP42 Table 1.4-3
Toluene	3.33E-06	lb/MMBtu	3.33E-06	lb/MMBtu	2.33E-05	5.11E-05	2.33E-05	5.11E-05		AP42 Table 1.4-3

Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN: A0005

Permit Number: AP1041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

TS REGEN HEATER (PROPANE)

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349
XXXX
XXXX

REVISION
TYPE OF AP
TYPE OF AP

Alt Operating Scenario?

Revision?

YES/NO

YES

YES

Notes

Propane is the alternative fuel.

Add new TS Regen Heater w/ propane as the alternative fuel.

I. EMISSION UNIT(S):

System	S2.XXX/ PFL.XXX	Description	Location UTM NAD 83 (m)		Manufacturer	Model #	Serial #	SCC #	Year Manufactured
			North	East					
142B	S2.362P	TS REGEN HEATER (PROPANE)	4,536,401	554,477				1-03-010-02	

II. CONTROL DEVICE(S):

Stack Parameters		Pollutant	Type	Control (%)	Manufacturer's Guarantee		Notes
					Factor	Unit	
Height (ft):	61.5	PM					
Diameter (ft):	1.67	PM10					
Temp (°F):	400	PM2.5					
Exit Vel (fps):	24.1	SO2					
Vol (ACFM):	3,154	NOX					
Vol (DSCFM):	1,900	CO					
		VOC					
		Pb					
		Hg					
		H2S					
		HAPS					

III. Operating Parameters:

Operating Hours		Throughput/Fuel Usage		Heat Input (MMBtu)		Power Output		Heat Content
hr/day	hr/yr	Hourly	Annual	Fuel Type	Hourly	Annual	Hourly	(BTU/gallon)
24	4,380	77.0	337,260.0	Propane	7.0	30,859.29		91,500

Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.

Default	Coal (BTU/lb)	Diesel (BTU/gal)	Gasoline (BTU/gal)	Natural Gas (BTU/scf)	Propane (BTU/gallon)
	13,000	140,000	114,000	1,020	91,500

If used a formula to calculate: TYPE FORMULA

IV. Emission Limit Calculations:

Pollutant	Other Emission Factor		Actual Emission Factor		Uncontrolled Emission Limit		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr		
PM			1.010	lb/1000 gallon	0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	s.f. = safety factor
PM10			1.010	lb/1000 gallon	0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	S = 15.5 gr/100 cu.ft. (185 ppmw)
PM2.5			1.010	lb/1000 gallon	0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
SO2			1.550	lb/1000 gallon	0.12	0.26	AP-42, Sec. 1.5, SO2 = 0.10*S	
NOX			19.364	lb/1000 gallon	1.49	3.27	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
CO			15.010	lb/1000 gallon	1.16	2.53	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
VOC			2.396	lb/1000 gallon	0.18	0.40	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	

Formula for Uncontrolled Limit (lb/hr):

Pollutant	Controlled Factor		Controlled Factor (%Control)		Controlled Emission Limit		Emission Limit (%Control)		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr		
PM			1.0	lb/1000 gallon			0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	s.f. = safety factor
PM10			1.0	lb/1000 gallon			0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	S = 15.5 gr/100 cu.ft. (185 ppmw)
PM2.5			1.0	lb/1000 gallon			0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
SO2			1.55	lb/1000 gallon			0.12	0.26	AP-42, Sec. 1.5, SO2 = 0.10*S	
NOX			19.364	lb/1000 gallon			1.49	3.27	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
CO			15.01	lb/1000 gallon			1.16	2.53	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	
VOC			2.396	lb/1000 gallon			0.18	0.40	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	

Formula for Controlled Limit(lb/hr):

V. Green House Gases

Pollutant	Emission Factor		Permitted Emission Limits		Reference	Notes	Factor	Unit	Compare to Source Testing	
	Factor	Unit	lb/hr	ton/yr					lb/hr	ton/yr
PM	1.010	lb/1000 gallon	0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	s.f. = safety factor				
PM10	1.010	lb/1000 gallon	0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	S = 15.5 gr/100 cu.ft. (185 ppmw)				
PM2.5	1.010	lb/1000 gallon	0.08	0.17	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)					
SO2	1.550	lb/1000 gallon	0.12	0.26	AP-42, Sec. 1.5, SO2 = 0.10*S					
NOX	19.364	lb/1000 gallon	1.49	3.27	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)					
CO	15.010	lb/1000 gallon	1.15	2.51	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)	Requested permit limit slightly different than calc'd above due to rounding error.				
VOC	2.396	lb/1000 gallon	0.18	0.40	AP-42, Sec. 1.5 w/ s.f. (applicant-requested)					

Pollutant	Factor	Unit	lb/hr	ton/yr	GWP Multiplier	GWP lb/hr	GWP ton/yr	Reference	Using Source Testing	
									GWP lb/hr	GWP ton/yr
CO2	139.00	lb/MMBtu	979.3	2,144.7	1	979.3	2,144.7			
CH4	0.0070	lb/MMBtu	0.0	0.1	21	1.0	2.3			
N2O	0.0013	lb/MMBtu	0.0	0.0	310	2.8	6.2			
TOTAL CO2e:						983	2,153	0		

VI. Hazardous Air Pollutants:

System 142B

Page 1 of 1

Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN: A0005

Permit Number: AP1041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

RESIN REGEN HEATER 1 (PROPANE)

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349
XXXX
XXXX

REVISION
TYPE OF AP
TYPE OF AP

Alt Operating Scenario?

YES/NO

Notes

Revision?

YES

Propane as alternative fuel for Resin Regen Heater 1
Add new Resin Regen Heater 1 w/ propane as the alternative fuel.

I. EMISSION UNIT(S):

System

S2.XXX/
PF1.XXX

Description

RESIN REGEN HEATER 1
(PROPANE)

Location UTM
NAD 83 (m)

North

East

Manufacturer

Model #

Serial #

SCC #

Year

Manufactured

II. CONTROL DEVICE(S):

Stack Parameters

Height (ft): 36
Diameter (ft): 1.33
Temp (°F): 400
Exit Vel (fps): 40.6
Vol (ACFM): 3,400
Vol (DSCFM): 2,100

Pollutant

PM
PM10
PM2.5
SO2
NOX
CO
VOC
Pb
Hg
H2S
HAPS

Control(s)

Type

Control (%)

Manufacturer's Guarantee

Factor

Unit

Notes

III. Operating Parameters:

Operating Hours

hr/day

hr/yr

24

8,760

Throughput/Fuel Usage

Hourly

Annual

Unit

gal

55.0

481,800.0

Fuel Type

Propane

Heat Input (MMBtu)

Hourly

Annual

5.0

44,084.70

Power Output

Unit

Heat Content
(BTU/gallon)

91,500

Note: The Conversion section is used for calculating to and from throughput/fuel usage and heat input using heat content values. See below for typical values.

Default

Coal
(BTU/lb)

13,000

Diesel
(BTU/gal)

140,000

Gasoline
(BTU/gal)

114,000

Natural Gas
(BTU/scf)

1,020

Propane
(BTU/gallon)

91,500

If used a formula to calculate: TYPE FORMULA

IV. Emission Limit Calculations:

Other Emission Factor

Factor

Unit

Actual Emission Factor

Factor

Unit

Uncontrolled

Emission Limit

lb/hr

ton/yr

Reference

Notes

PM

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

s.f. = safety factor

PM10

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

S = 15.5 gr/100 cu.ft. (185 ppmw)

PM2.5

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

SO2

1.550

lb/1000 gallon

0.09

0.37

AP-42, Sec. 1.5, SO2 = 0.10*S

NOX

19.364

lb/1000 gallon

1.07

4.66

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

CO

15.010

lb/1000 gallon

0.83

3.62

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

VOC

2.396

lb/1000 gallon

0.13

0.58

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

Formula for Uncontrolled Limit (lb/hr):

Controlled

Controlled Factor

Factor

Unit

Controlled Factor (%Control)

Factor

Unit

Emission Limit

lb/hr

ton/yr

Emission Limit (%Control)

lb/hr

ton/yr

Reference

Notes

PM

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

s.f. = safety factor

PM10

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

S = 15.5 gr/100 cu.ft. (185 ppmw)

PM2.5

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

SO2

1.550

lb/1000 gallon

0.09

0.37

AP-42, Sec. 1.5, SO2 = 0.10*S

NOX

19.364

lb/1000 gallon

1.07

4.66

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

CO

15.010

lb/1000 gallon

0.83

3.62

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

VOC

2.396

lb/1000 gallon

0.13

0.58

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

Formula for Controlled Limit(lb/hr):

Permitted Emission Limits

Pollutant

Factor

Unit

lb/hr

ton/yr

Reference

Notes

Factor

Unit

Compare to Source Testing

lb/hr

ton/yr

PM

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

s.f. = safety factor

PM10

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

S = 15.5 gr/100 cu.ft. (185 ppmw)

PM2.5

1.010

lb/1000 gallon

0.06

0.24

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

SO2

1.550

lb/1000 gallon

0.09

0.37

AP-42, Sec. 1.5, SO2 = 0.10*S

NOX

19.364

lb/1000 gallon

1.07

4.66

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

CO

15.010

lb/1000 gallon

0.82

3.59

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

Requested permit limits slightly different than calc'd above due to rounding error.

VOC

2.396

lb/1000 gallon

0.13

0.57

AP-42, Sec. 1.5 w/ s.f. (applicant-requested)

Requested annual permit limit slightly different than calc'd above due to rounding error.

V. Green House Gases

Factor

Unit

lb/hr

ton/yr

GWP Multiplier

GWP lb/hr

GWP ton/yr

Reference

GWP lb/hr

GWP ton/yr

CO2

139.00

lb/MMBtu

699.5

3,063.9

1

699.5

3,063.9

CH4

0.0070

lb/MMBtu

0.0

0.2

21

0.7

3.2

N2O

0.0013

lb/MMBtu

0.0

0.0

310

2.0

8.0

TOTAL CO2e:

702

3,076

0

VI. Hazardous Air Pollutants:

Nevada Division of Environmental Protection

Bureau of Air Pollution Control

POLLUTANTS

EMISSIONS CALCULATIONS

FIN:

A0005

Permit Number:

AP1041-2805

Facility Name:

BARRICK GOLDSTRIKE

Project Name:

RIL CIRCUIT OPTC

System:

RIL EMERGENCY GENERATOR

By:

PAT MOHN

Date:

5/21/2013

Air Case:

7349

REVISION

XXXX

TYPE OF AP

XXXX

TYPE OF AP

Alt Operating Scenario?

YES/NO

Notes

Revision?

YES

Add new diesel generator.

Approved:

Date:

7/24/2013

I. EMISSION UNIT(S):

System	S2.XXX/ PF1.XXX	Description	Location UTM NAD 83 (m)		Manufacturer	Model #	Serial #	SCC #	Year
			North	East					
144	S2.364	RIL EMERGENCY GENERATOR	4,536,292	554,548	CAT	3516C		2-02-004-01	2013

II. CONTROL DEVICE(S):

Pollutant	Type	Control (%)	Manufacturer's Guarantee		Notes
			Factor	Unit	
PM					
PM10					
PM2.5					
SO2					
NOX					
CO					
VOC					
Pb					
Hg					
H2S					
HAPS					

Stack Parameters

Height (ft):	15
Diameter (ft):	1.0
Temp (°F):	915
Exit Vel (fps):	416
Vol (ACFM):	19,600
Vol (DSCFM):	7,555

III. Operating Parameters:

Operating Hours		Throughput/Fuel Usage			Heat Input (MMBtu)			Power Output		Heat Content
hr/day	hr/yr	Hourly	Annual	Unit	Fuel Type	Hourly	Annual	Hourly	Unit	(BTU/gal)
24	100	184.3	18,430.0	gal	Diesel	25.44	2,543.34	3,634	hp	138,000
Default		Coal (BTU/lb)	Diesel (BTU/gal)	Gasoline (BTU/gal)	Natural Gas (BTU/scf)	Propane (BTU/gallon)	If used a formula to calculate: TYPE FORMULA			
		13,000	138,000	114,000	1,020	90,500				

IV. Emission Limit Calculations:

Pollutant	Other Emission Factor		Actual Emission Factor		Emission Limit		Reference	Notes (NSPS Subpart IIII)
	Factor	Unit	Factor	Unit	lb/hr	ton/yr		
PM			0.04725	lb/mmmbtu	1.20	0.06	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)
PM10			0.04725	lb/mmmbtu	1.20	0.06	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)
PM2.5			0.04725	lb/mmmbtu	1.20	0.06	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)
SO2			0.00153	lb/mmmbtu	0.04	0.002	ULSD, 15 ppmw S (40CFR80.510(a))	40CFR 60.4207(b)
NOX			1.5022	lb/mmmbtu	38.22	1.91	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)
CO			0.8219	lb/mmmbtu	20.91	1.05	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)
VOC			0.3054	lb/mmmbtu	7.77	0.39	40CFR89.112, Tier 1, >560 HP	Higher EF than AP-42

Formula for Uncontrolled Limit (lb/hr):

Pollutant	Controlled Factor		Controlled Factor (%Control)		Emission Limit		Emission Limit (%Control)		Reference	Notes
	Factor	Unit	Factor	Unit	lb/hr	ton/yr	lb/hr	ton/yr		
PM			0.04725	lb/mmmbtu			1.20	0.06	40CFR89.112, Ti	40CFR 60.4202(b)(2)
PM10			0.04725	lb/mmmbtu			1.20	0.06	40CFR89.112, Ti	40CFR 60.4202(b)(2)
PM2.5			0.04725	lb/mmmbtu			1.20	0.06	40CFR89.112, Ti	40CFR 60.4202(b)(2)
SO2			0.00153	lb/mmmbtu			0.04	0.002	ULSD, 15 ppmw	40CFR 60.4207(b)
NOX			1.5022	lb/mmmbtu			38.22	1.91	40CFR89.112, Ti	40CFR 60.4202(b)(2)
CO			0.8219	lb/mmmbtu			20.91	1.05	40CFR89.112, Ti	40CFR 60.4202(b)(2)
VOC			0.3054	lb/mmmbtu			7.77	0.39	40CFR89.112, Ti	Higher EF than AP-42

Formula for Controlled Limit(lb/hr):

Permitted Emission Limits

Pollutant	Factor	Unit	lb/hr	ton/yr	Reference	Notes	Factor	Unit	lb/hr	ton/yr
PM	0.04725	lb/mmmbtu	1.20	0.06	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)				
PM10	0.04725	lb/mmmbtu	1.20	0.06	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)				
PM2.5	0.04725	lb/mmmbtu	1.20	0.06	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)				
SO2	0.00153	lb/mmmbtu	0.04	0.002	ULSD, 15 ppmw S (40CFR80.510(a))	40CFR 60.4207(b)				
NOX	1.5022	lb/mmmbtu	38.22	1.91	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)				
CO	0.8219	lb/mmmbtu	20.91	1.05	40CFR89.112, Tier 2, >560 HP	40CFR 60.4202(b)(2)				
VOC	0.3054	lb/mmmbtu	7.77	0.39	40CFR89.112, Tier 1, >560 HP	Higher EF than AP-42				

V. Green House Gases

	Emission Factor		lb/hr	ton/yr	GWP Multiplier	GWP lb/hr	GWP ton/yr	Using Source Testing	
	Factor	Unit						Reference	GWP lb/hr
CO2	163.08	lb/MMBtu	4,148.8	207.4	1	4,148.8	207.4	40CFR98(Tbl. C-1)	
CH4	0.0066	lb/MMBtu	0.2	0.0	21	3.5	0.2	40CFR98(Tbl. C-2)	
N2O	0.0013	lb/MMBtu	0.0	0.0	310	10.3	0.5	40CFR98(Tbl. C-2)	
TOTAL CO2e:						4,163	208	40CFR98(Tbl. C-1)	

VI. Hazardous Air Pollutants:

HAP Pollutant	Uncontrolled		Controlled		Uncontrolled		Controlled		Removal Factor	Calculation Reference
	Factor	Unit	Factor	Unit	Emission (lb/hr)	Emission (ton/yr)	Emission (lb/hr)	Emission (ton/yr)		
TOTALS:					0.11	0.01	0.11	0.01		AP 42 T3.4-3
Benzene	7.76E-04	lb/MMBtu	7.76E-04	lb/MMBtu	1.97E-02	9.87E-04	1.97E-02	9.87E-04		AP 42 T3.4-3
Toluene	2.81E-04	lb/MMBtu	2.81E-04	lb/MMBtu	7.15E-03	3.57E-04	7.15E-03	3.57E-04		AP 42 T3.4-3
Xylenes	1.93E-04	lb/MMBtu	1.93E-04	lb/MMBtu	4.91E-03	2.45E-04	4.91E-03	2.45E-04		AP 42 T3.4-3
Propylene	2.79E-03	lb/MMBtu	2.79E-03	lb/MMBtu	7.10E-02	3.55E-03	7.10E-02	3.55E-03		AP 42 T3.4-3
Formaldehyde	7.89E-05	lb/MMBtu	7.89E-05	lb/MMBtu	2.01E-03	1.00E-04	2.01E-03	1.00E-04		AP 42 T3.4-3
Acetaldehyde	2.52E-05	lb/MMBtu	2.52E-05	lb/MMBtu	6.41E-04	3.20E-05	6.41E-04	3.20E-05		AP 42 T3.4-3
Acrolein	7.88E-06	lb/MMBtu	7.88E-06	lb/MMBtu	2.00E-04	1.00E-05	2.00E-04	1.00E-05		AP 42 T3.4-3
Total PAH	2.12E-04	lb/MMBtu	2.12E-04	lb/MMBtu	5.39E-03	2.70E-04	5.39E-03	2.70E-04		AP 42 T3.4-4

System 144

Page 1 of 1